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ABSTRACT

Provided are the scope and sequence of mathematics topics for Grade 1 to be implemented by teachers and supervisors. The guide is presented in the form of 66 units, each being organized around the themes of (1) sets, numbers, and numeration; (2) operations; (3) geometry and measurement; and (4) algebraic concepts, graphs, probability, and statistics. The sequence is structured to provide a spiral or cyclic approach for presentation of the concepts and skills. (Author/JG)

MATHEMATICS

· Grade 1

Scope and Sequence

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MATHEMATICS

Grade 1

Scope and Sequence

BUREAU OF CURRICULUM DEVELOPMENT
BOARD OF EDUCATION OF THE CITY OF NEW YORK

F O R E W O R D

The foundations of our continuing program in mathematics education are laid in the primary grades. The intuitive understanding of mathematical ideas which children already possess and bring with them to Grade 1 is used as the basis for developing basic concepts and competence in the use of numbers.

This publication is designed to develop and extend the mathematical understandings and computational skills of children in Grade 1. It is an integral part of the series, Mathematics: Scope and Sequence Grades 2-3; Grades 4-5; Grade 6. The bulletin provides the overall scope and detailed sequence which teachers and supervisors translate into specific learning activities for children.

Sincere appreciation is expressed to the staff members of the Bureau of Curriculum Development and the Bureau of Mathematics who cooperated in the development of this bulletin to aid teachers in helping each child realize his full potential in new and exciting areas of mathematics.

SEELIG LESTER
Deputy Superintendent of Schools

A C K N O W L E D G M E N T S

The preparation of this bulletin was under the general direction of Seelig Lester, Deputy Superintendent for Instructional Services; David A. Abramson, Acting Director, Bureau of Curriculum Development; and George Grossman, Director, Bureau of Mathematics.

Leonard Simon, Acting Assistant Director, Bureau of Curriculum Development, supervised the project.

The material was planned and prepared by Blanche C. Gladstone, Alice D. Lombardi, and Bertha O. Weiss, Bureau of Curriculum Development.

Frank J. Wohlfort, Assistant Director, Bureau of Mathematics, assisted in evaluating the scope and sequence.

Appreciation is expressed to Frances Moskowitz, Bureau of Curriculum Development, for her assistance in processing the materials.

Edythe Kahn, Editor, Bureau of Curriculum Development, had overall responsibility for design and production. Simon Shulman designed the cover; Ellwood White prepared it for printing.

C O N T E N T S

I N T R O D U C T I O N

The scope and sequence for Grade 1 is presented in the form of 66 units. Each unit may require one or more lessons.

The units are organized around four central themes. These themes are coded as shown below:

* Sets; Number; Numeration
** Operations
*** Geometry and Measurement
**** Algebraic Concepts; Graphs; Probability; Statistics

The sequence is structured to provide a spiral or cyclic approach for presentation of the concepts and skills. For example, the development of addition and subtraction facts within the sum of 10 begins in Units 22 and 23, continues in Units 26, 28, 33, 43, 46, and is reinforced in Unit 49.

The teacher should make provision for review, reinforcement, practice, and evaluation to meet the particular needs of the class.

Many activities, learning experiences, and teaching suggestions helpful in implementing this scope and sequence are offered in Mathematics: Prekindergarten, Kindergarten, Grade One, Part One; Part Two, Curriculum Bulletin 1966-67 Series, No. 6a; 6b.

Mathematical Goals for Grade 1

1. Sets; Number; Numeration

Set concepts: members, describing a set, number property of a set, empty set, subset; union; removing a subset
One-to-one correspondence; two-to-one correspondence; many-to-one correspondence
Matching elements of two sets of objects using comparison terms such as: more, fewer, as many as; greater than, less than
Whole numbers through 50
Counting objects by ones, by twos, by fives, by tens, to 50 and beyond
Grouping objects by tens and ones; beginning ideas of place value concept
Ordering numbers through 50
Concept of even and odd numbers
Reading and writing numerals through 50
Ordinal use of the numbers one through 10

2. Addition of Whole Numbers

Basic facts, sums through 18
Commutative and associative properties of addition; role of zero
Addition and subtraction as related operations

3. Subtraction of Whole Numbers

Concept of subtraction as comparison-difference
Basic subtraction facts associated with addition facts
Role of zero in subtraction

4. Fractional Numbers

Concept of halves, fourths, eighths, thirds of bulk; of capacity of container
Concept of halves, fourths, of an object
Separating sets of 10 or more objects into halves, into fourths; naming number of objects in each part

5. Geometry

Position terms such as: inside, outside, on, center, vertical, horizontal
Properties of solid figures: rectangular, cylindrical, spherical, triangular
Comparing properties of plane figures: rectangles, squares, circles, triangles
Concept of point, line, line segment, chord, radius
Symmetry - paper folding

6. Measurement

Money: recognition and relationships pennies-nickels-dimes-quarter
Time: Clock: concept of hour, half-hour
telling time by the hour, by the half-hour
terms such as: before the hour, after the hour
Calendar: names of days of the week
names of months
relationships: days-week; days-month
terms such as: today, tomorrow, yesterday, last Sunday, next Tuesday
Capacity: conservation of quantity
non-standard units of capacity
standard unit - cup
Weight: non-standard units of weight
terms such as: heavier, heaviest; lighter, lightest
Temperature: reading thermometer using non-numerical expressions
Linear: non-standard units of length
terms such as: longer, longest; twice as long; one-fourth as long
early concept of perimeter

7. Algebraic Concepts

Symbols: +, -, =, placeholder
Number sentences: true, false, open
Reading and writing number sentences
Expressing problems as open sentences
Associating numbers with points on a number line

8. Statistics; Probability; Graphs

Tallying; concept of frequency
Collecting data; representing two or more sets of data by means of objects, pictures, cubes, discs, paper squares, etc.
Concept of probability, two possible outcomes

MATHEMATICS: GRADE 1

Scope and Sequence

*

1. Numeration

Use classroom, school, and neighborhood experiences to observe and identify number names.

***

2. Measurement: Time

Use experience situations to reinforce and/or develop concept of time.
Use terms such as:
daytime, nighttime
today, tomorrow, yesterday
morning, noon, afternoon, night

*

3. Sets

Use objects to reinforce and/or develop understanding of set concepts:
meaning
description
members
the empty set

*

4. Sets; Number; Numeration

Use experience situations to observe one-to-one, two-to-one, many-to-one correspondence. Some experience situations are:
a set of objects for a set of children
a set of objects with a set of related objects
a set of tallies for a set of children or objects

Reinforce and/or develop understanding of equivalent and non-equivalent sets by matching objects in a one-to-one correspondence.

Use terms: as many as, more, fewer.

*

5. Sets; Number; Numeration

Use activities to establish the idea of a "one more" order of sets of one, two, three, four, five objects.

Use terms: one more, one fewer.

*

6. Sets; Number; Numeration

Reinforce and/or develop understanding that equivalent sets have the same number.

Introduce and/or develop the number property of sets of up to 5 objects.
Associate the numeral with the number of objects in a set.
Read and write numerals from 0-5.

*

7. Sets; Number; Numeration

Develop understanding of the order of whole numbers through 5 by ordering sets of objects.

To compare two numbers use terms:
is less than, is greater than
is 1 less than, is 1 greater than

*

8. Sets; Number; Numeration

Develop the number property of sets of 6, 7, 8, 9, and 10 objects.

Include:
counting by patterning successive sets of objects
associating the numeral with the number of objects in a set
reading and writing numerals from 6-10

*

9. Sets; Number; Numeration

Develop understanding of the order of whole numbers through 10 by ordering sets of objects.

Include:
counting forward and backward by ones through 10
comparing two numbers using terms - is less than, is greater than; is 1 less than, is 1 greater than
number sequences 1, 2, 3, __ __ 6

****

10. Graphs

Use experience situations to introduce graphical representations as a means of showing relationships.

Collect and sort data.

Use pictures, discs, cubes, etc. to represent frequency.

Discuss and interpret these representations.

Note: It is recommended that relationships be pictured throughout the school year.

*

11. Sets; Number; Numeration

Discover equivalent and non-equivalent subsets in sets of 2 to 5 objects.

Observe that a number has many names.

***

12. Measurement: Length

Through explorations with a variety of objects, reinforce and/or develop concept of length.

Use comparative terms: longer, shorter, same length, longest, shortest.

***

13. Geometry

Use objects familiar to the children such as cereal boxes, shoe boxes, rectangular blocks to observe characteristics of rectangular solids.

Use similar objects to develop the idea of a rectangle; of a square. Include:

recognizing drawings of rectangles, squares
using terms: inside, outside, on

*

14. Sets; Number; Numeration

Reinforce counting forward and backward by ones through 10.

Develop counting procedures for counting forward and backward by twos.

Introduce the concept of even number and odd number.

*

15. Number; Numeration

Reinforce Unit 11. Discover equivalent and non-equivalent subsets in sets of 6 objects; in sets of 7 objects.

Observe that a number has many names.

*

16. Number; Numeration

Use experience situations to develop the ordinal use of number - first through fifth.

*

17. Sets; Number; Numeration

Reinforce Units 11 and 15. Discover equivalent and non-equivalent subsets in sets of 8 objects; in sets of 9 objects; in sets of 10 objects.

Observe that a number has many names.

***

18. Geometry

Use activities and materials to develop geometric concepts of line, point, line segment.
Show lines in all positions: horizontal, vertical, oblique.

***

19. Measurement: Money

Use experience situations to reinforce and/or develop relationship between five pennies and a nickel; 10 pennies and a dime.

Include:
- distinction between a coin and its value
- exchange
- reading and writing symbols: 5¢, 5 cents

*

20. Number; Numeration

Use a number line to reinforce and extend the understanding of the order of numbers zero through 10.
Use terms:
- before, after, between
- is greater than, is less than
- is one greater than, is one less than

*

21. Number; Numeration

Using objects, introduce grouping by tens and ones to develop understanding of numbers 11 through 20.

Describe the groupings as:
10 and 1, 10 and 2, 10 and 3, ... 10 and 10
1 ten and 1, 1 ten and 2, 1 ten and 3, ... 1 ten and ten or 2 tens
eleven, twelve, thirteen, ..., twenty
11, 12, 13, ..., 20

Include appropriate counting experiences.

**

22. Addition of Whole Numbers

Use discs, beads, and other objects to develop the idea of adding 1 to the numbers 0, 1, 2, 3, 4.

Record number sentences using symbols +, =.

Observe commutative property of addition.

Use similar procedures to develop the idea of adding 2 to the numbers 0, 1, 2, 3.

**

23. Subtraction of Whole Numbers

Use materials such as discs, beads to develop the idea of subtracting 1 from the numbers 5, 4, 3, 2, 1.

Record number sentences using symbols -, =.

Use similar procedures to develop the idea of subtracting 2 from the numbers 5, 4, 3, 2.

***

24. Measurement: Weight

Through exploration with a variety of objects reinforce and/or develop concept of weight.
Use comparative terms: heavier, lighter, heaviest, lightest

*

25. Number; Numeration

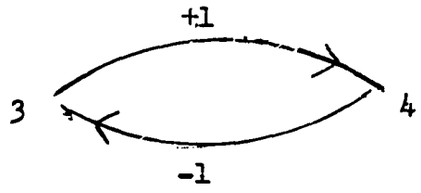
Use games, materials, number line to continue to develop:
understanding of the order of whole numbers 0 through 20
counting forward and backward by ones, by twos
comparing numbers 0 through 20 by using terms such as: is less than, is greater than; is 1 less than, is 1 greater than
observing even and odd number patterns

**

26. Addition and Subtraction of Whole Numbers

Use activities with objects to develop the understanding that addition and subtraction are related operations.

Recall sums through 5 by using this principle.



Write number sentences such as:

2 + 1 = 3	3 + 1 = 4	4 + 1 = 5	3 + 2 = 5
3 - 1 = 2	4 - 1 = 3	5 - 1 = 4	5 - 2 = 3

***

27. Measurement: Capacity

Through explorations with bulk, with liquid, and containers of various shapes and sizes, develop concepts of capacity and conservation.

Use terms:
full, almost full, empty
glassful, jarful
more, less

**

28. Addition and Subtraction of Whole Numbers

Reinforce adding and subtracting within sums of five.

Use materials such as discs, beads, and a number line to develop the

idea of adding 1 to the numbers 5, 6, 7, 8, 9; subtracting 1 from the numbers 6, 7, 8, 9, 10.

Observe that addition and subtraction are related operations.

Observe commutative property of addition.

Record number sentences using +, -, =, □.

*

29. Number; Numeration

Adapt suggestions in Unit 21 to develop understanding of numbers 21 through 30.

***

30. Measurement: Money

Use suggestions indicated in Unit 19 to develop relationships among nickels-dimes-pennies.

Include counting by fives and by tens.

***

31. Measurement: Time

Using activities involving the calendar, develop concept of time in terms of a day, a week, a month.

Include:
relationships day-week, day-month
name of the month, names of the days of the week
reading numerals on calendar
terms such as: next Sunday, last Sunday
name of the day after, name of the day before

Note: It is recommended that activities involving the calendar be presented throughout the school year.

*

32. Number; Numeration

Adapt suggestions indicated in Unit 25 to order and compare numbers through 30.

**

33. Addition and Subtraction of Whole Numbers

Adapt suggestions indicated in Unit 28 to develop the idea of adding 2 to the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8; subtracting 2 from the numbers 2, 3, 4, 5, 6, 7, 8, 9, 10.

Use horizontal and vertical notation.

*

34. Number; Numeration

Adapt suggestions in Unit 21 to develop understanding of numbers 31 through 40.

***

35. Geometry

Using objects familiar to children, observe characteristics of spherical and cylindrical objects. Compare these with rectangular objects.

Observe characteristics of circular shapes.
Include terms:
circle, center, radius, chord
inside, outside, on

***

36. Measurement: Time

Use activities and the clock to develop telling time by the hour.
Include:
observing and reading the numerals
noting the direction of the numerals and the movement of the hands
telling time as: after 2 o'clock, before 4 o'clock, nearly 6 o'clock, 3 o'clock

*

37. Number; Numeration

Adapt suggestions indicated in Unit 25 to order and compare numbers through 40.

****

38. Algebraic Concepts

Solve simple story problems using previously developed addition and subtraction facts.

Express problems as open sentences.

*

39. Number; Numeration

Use experience situations to continue to develop the ordinal use of number - sixth through tenth.

***

40. Measurement: Money

Use suggestions indicated in Units 19 and 30 to develop relationships among quarters-nickels-dimes-pennies.

*

41. Fractional Numbers

Use heaps of rice, barley, grass seeds, etc. to reinforce and/or develop understanding of halves; of halves and fourths. Develop understanding of halves, fourths and eighths; of thirds.

***

42. Measurement: Temperature

Use activities to reinforce and/or develop concept of temperature. Include terms: warmer-colder.

Through activities, develop understanding that a thermometer is used to measure temperature.
Include terms: higher-warmer; lower-colder.

**

43. Addition and Subtraction of Whole Numbers

Adapt suggestions indicated in Unit 28 to develop the idea of adding 3 to the numbers 0, 1, 2, 3, 4, 5, 6, 7, and subtracting 3 from the numbers 3, 4, 5, 6, 7, 8, 9, 10.

Use horizontal and vertical notation.

***

44. Measurement: Length

Use non-standard units of length such as pencils, straws, strings of beads to measure the lengths of familiar objects.
Use terms such as: twice as long, one-fourth as long.

Include beginning ideas of perimeter.

*

45. Fractional Numbers

Experiment with filling containers to continue to develop understanding of one-half and one-fourth of the capacity of a container.

**

46. Addition and Subtraction of Whole Numbers

Adapt suggestions indicated in Unit 28 to develop the idea of adding 4 to the numbers 0, 1, 2, 3, 4, 5, 6, and subtracting 4 from the numbers 4, 5, 6, 7, 8, 9, 10.

Use horizontal and vertical notation.

*

47. Number; Numeration

Adapt suggestions in Unit 21 to develop understanding of numbers 41 through 50.

**

48. Addition and Subtraction of Whole Numbers

Use experiences to introduce zero as the identity element for addition.
Use experiences leading to number sentences such as:

1 + 0 = 1	0 + 1 = 1
2 + 0 = 2	0 + 2 = 2
3 + 0 = 3	0 + 3 = 3
etc.	etc.

Develop the understanding that when zero is subtracted from a number the result is that number.
Use experiences leading to number sentences such as:

1 - 0 = 1
2 - 0 = 2
3 - 0 = 3
etc.

Develop the understanding that when any number is subtracted from itself the result is zero.
Use experiences leading to number sentences such as:

1 - 1 = 0
2 - 2 = 0
3 - 3 = 0
etc.

**

49. Addition and Subtraction of Whole Numbers

Reinforce all the related addition and subtraction facts involving sums through 10.

Include:
- many names for a number
- doubles, near-doubles
- number sentences; related number sentences
- story problems
- vertical notation

*

50. Fractional Numbers

Use classroom experiences to reinforce and/or develop understanding of halves of a single object; fourths of a single object. Record terms such as 1 half, 2 halves; 1 fourth, 2 fourths, 3 fourths, 4 fourths.

***

51. Geometry

Experiment with folding paper into halves, into fourths.

Cut out designs and use mirrors to observe symmetry.

**

52. Addition of Whole Numbers

Use discs, beads and other objects to develop the idea of adding 3 numbers whose sum is 10 or less.

Explore to discover that the manner of grouping three addends does not change their sum. (Associative Property of Addition)

Record horizontally and vertically.

*

53. Number; Numeration

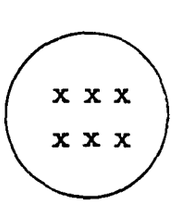
Adapt suggestions indicated in Unit 25 to order and compare numbers through 50.

**

54. Subtraction of Whole Numbers

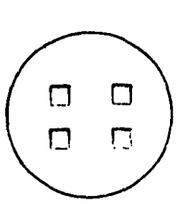
Using sets of objects, introduce concept of subtraction as comparison-difference. For example, how many more members are there in one set than in another?

Set A



How many____.

Set B



Home many____

How many more are in Set A____

**

55. Addition and Subtraction of Whole Numbers

Discover and record all the related addition and subtraction facts involving the sum 11.

***

56. Measurement: Capacity and Weight

Continue to develop concepts of capacity and weight:
compare capacities of a variety of containers
compare heights (lengths) of levels of contents in containers of the same size. Then compare their weights.

*

57. Number; Numeration

Introduce grouping by tens and counting by tens to 50 and beyond.

Record numerals as: 3 tens = 30.

**

58. Addition and Subtraction of Whole Numbers

Discover and record all the related addition and subtraction facts involving the sum 12.

*

59. Fractional Numbers

Use sets of small objects such as cubes, peanuts to reinforce and/or develop the concept that a set may be partitioned into two equivalent subsets (halves); into four equivalent subsets (fourths).

Estimate, discover, and name the number in each half; in each fourth; and in the original set.

***

60. Measurement: Capacity

Through activities, measure capacity using non-standard units such as paper cups.

Introduce the 8 oz. cup as a standard unit of measure.

**

61. Addition and Subtraction of Whole Numbers

Introduce for further development in Grade 2 the related addition and subtraction facts involving the sum 13.

***

62. Geometry

Reinforce recognition of rectangular, spherical, and cylindrical objects.

Experiment with triangular blocks to discover some of their characteristics.

Compare them with rectangular blocks.

Observe characteristics of triangles.

Include terms: triangle, inside, outside, on, line segment.

**

63. Addition and Subtraction of Whole Numbers

Introduce for further development in Grade 2 the related addition and subtraction facts involving the sum 14.

***

64. Measurement: Time

Use activities with the clock to develop telling time by the half-hour.

****

65. Probability; Statistics; Graphs

Use games such as "Guess Which Hand," to develop concept of probability.

Note frequency of successful outcomes.

Use discs, cubes, etc. to record and picture results.

**

66. Addition and Subtraction of Whole Numbers

Introduce for further development in Grade 2 the related addition and subtraction facts involving the sum 15; the sum 16; the sum 17; the sum 18.